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November 18, 1998

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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

HAND DELIVERED

Ms. Magalie Roman Salas  
Office of the Secretary  
Federal Communications Commission  
1919 M Street, N.W., Room 222  
Washington, D.C. 20554

Re: In the Matter of Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use, IB Docket No. 98-172.

Dear Ms. Salas:

Enclosed herewith is one (1) original and five (5) copies of our comments submitted to the Notice of Proposed Rulemaking in IB Docket 98-172.

Sincerely,

Christopher R. Hardy  
Vice President  
Microwave and Satellite

Enclosure

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**FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY**

**Before the  
Federal Communications Commission  
Washington, DC 20554**

In the Matter of	)	
	)	
Redesignation of the 17.7-19.7 GHz Frequency	)	
Band, Blanket Licensing of Satellite Earth	)	IB Docket No. 98-172
Stations In the 17.7-20.2 GHz and 27.5-30.0	)	RM-9005
GHz Frequency Bands, and the Allocation of	)	RM-9118
Additional Spectrum In the 17.3-17.8 GHz	)	
and 24.75-25.25 GHz Frequency Bands for	)	
Broadcast Satellite-Service Use	)	

**Comments of Comsearch**

Comsearch, hereby respectfully submits the following comments to the Notice of Proposed Rulemaking ("NPRM") in the above captioned proceeding.

Comsearch is an independent engineering firm specializing in spectrum management of terrestrial microwave, satellite and mobile telecommunications systems. Comsearch works with the FCC and actively participates in industry groups such as the National Spectrum Managers Association (NSMA) and the Telecommunications Industry Association (TIA) to develop rules, industry recommendations, and standards to promote efficient use of the radio spectrum. Our experience in engineering and coordinating both satellite and microwave systems makes us qualified to comment in this proceeding.

## **FCC's Proposed Band Plan**

We recognize the daunting challenge faced by the Commission to develop a band redesignation proposal that meets the specific requirements of all services authorized to operate in the band and applaud the significant efforts reflected in the NPRM to move this issue forward. The primary proposal included in the NPRM goes far at addressing many of the various issues; however, we feel there are several specific disadvantages associated with the Commission's plan. We believe that an alternative band plan approach could be implemented to minimize the impact on incumbent terrestrial systems while maximizing use of the spectrum by emerging satellite systems. The overall disadvantage of the Commission's proposal is that it results in the near total disruption of the existing Fixed Service (FS) frequency plans. According to the plan, little of the existing FS spectrum will remain unaffected and many links will require relocation, retuning, or replacement. The specific disadvantages include the following:

- Requires new channel plans that would be negatively impacted by the existing links in the 17.7-18.3 and 18.55-18.8 GHz bands<sup>1</sup> and would require the manufacture of radio equipment using a new transmit to receive (T/R) frequency spacing<sup>2</sup>

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<sup>1</sup> Adding new channel plans and new links following the 1560 MHz T/R split minimizes the interference impact because problem interference cases tend to be reciprocal – if the transmitter at Site A affects the receiver at Site B, then the transmitter at Site B also is likely to affect the receiver at Site A. Changing an antenna or picking a new frequency pair can resolve both interference cases at once. Conversely, adding new channel plans and new links that affect both the existing 1560 MHz T/R split links and the existing 340 MHz T/R split links *at the same time* greatly increases the interference complexity. The analysis of the “Go” and “Return” frequencies on a link is independent and multiple modifications and upgrades (at greater expense) may be required to find workable frequencies.

<sup>2</sup> As many as possible of the existing channel pairs with 1560 MHz T/R split should be maintained in the new channel plans. Even so, to the extent that frequencies from 18.55-18.8 would have to be paired with frequencies from 17.7-18.3 and/or frequencies from 19.3-19.7 under the Commission's proposal, new radio equipment would have to be designed and manufactured to use the new T/R spacing(s). To minimize equipment complications, the

- Requires sharing between new CARS/AML and existing FS in the 17.7-18.14 portions of the band.<sup>3</sup>
- Requires potential relocation of CARS from the 18.3 – 18.55 GHz band.<sup>4</sup>
- Requires the rechannelization of the existing 1560 MHz split channels to accommodate two non-contiguous band segments.<sup>5</sup>

### **Suggestions for an Alternative Band Allocation Plan**

We propose the following alternative band plan that we believe minimizes the impact on incumbents and facilitates sharing of the 18 GHz spectrum.<sup>6</sup>

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Commission should make an effort to reduce or eliminate new T/R spacings in the new channel plans.

<sup>3</sup> Coordinating full block CARS systems into the same spectrum occupied by other 18 GHz point-to-point systems is anticipated to be difficult since both services are competing for spectrum primarily in the same urban areas. In most urban areas the existing terrestrial fixed services will preclude full block usage by the private cable systems. One existing path with a frequency anywhere within the desired 440 MHz block could spoil the private cable users plans.

<sup>4</sup> The FCC's plan overlays ubiquitous GSO/FSS with existing CARS/AML. In order to provide interference free service the GSO/FSS provider may find it necessary to relocate CARS/AML links. This relocation into spectrum already occupied by other FS links would be difficult as stated above.

<sup>5</sup> The Commission's proposal designates two 400 MHz band segments for FS point-to-point services with 19.3 – 19.7 GHz paired with non-contiguous band segments 18.55-18.8 GHz and 150 MHz of the 17.7 – 18.3 GHz band.

<sup>6</sup> For the chart shown the services shown in capital letters represent primary allocations, lower case secondary allocations, and bold capital letters indicate that earth station frequency coordination is not required, i.e. FSS downlinks could be ubiquitously deployed and licensed.

<b>GSO/FSS</b>	<b>GSO/FSS</b>	<b>NGSO/FSS</b>	<b>MSS FEEDERLINKS FIXED</b>	<b>GSO/FSS</b>
<b>FIXED</b>	<b>fixed</b>	<b>fixed</b>	<b>FIXED</b>	<b>ngso/fss</b>
<b>Ngso/fss</b>	<b>ngso/fss</b>	<b>gso/fss</b>	<b>gso/fss</b>	
<b>850 MHz</b>	<b>250 MHz</b>	<b>500 MHz</b>	<b>400 MHz</b>	<b>500 MHz</b>
<b>17.7</b>	<b>18.55</b>	<b>18.80</b>	<b>19.30</b>	<b>19.70 20.2 GHz</b>

- Assign the 17.7 – 18.55 GHz and 19.3 – 19.7 GHz bands on a co-primary basis to the Fixed Service and GSO/FSS, maintaining a majority of the existing 1560 MHz split and CARS Private Cable 6 MHz channels.
- Repackage portions of the 17.7 – 18.55 and 19.3 – 19.7 GHz bands to accommodate narrowband channels<sup>7</sup>
- Convert 18.58-18.82 and 18.92-19.16 GHz bands (340 MHz split channels) from FS to FSS use.<sup>8</sup>
- Assign 18.55-18.8 GHz to GSO/FSS and 18.8-19.3 GHz to NGSO/FSS.
- Maintain the Commission's proposed assignment of the 19.7 – 20.2 GHz band for GSO/FSS.

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<sup>7</sup> Most of the potentially displaced 340 MHz split channels operate on a 5 MHz bandwidth. The 1560 MHz split only accommodates bandwidths of 10 MHz or greater.

<sup>8</sup> Since DEMS has already been relocated and the Commission views low power point-to-multipoint services as a non-interference issue with FSS earth stations (para 42 of the NRPM), the 18.58-19.26 GHz band would then be free for FSS use.

Comsearch realizes that in order to implement the above band plan the power flux density restrictions imposed by the Earth Exploration Satellite and Space Research services in the 18.6 - 18.8 GHz must be relaxed sufficiently to accommodate operation of small “ubiquitously” deployed GSO/FSS earth stations”

### **Advantages of the Comsearch Proposed Plan**

- Introduces minimal disruption of the existing terrestrial base by keeping the 1560 MHz split and CARS channels virtually intact.<sup>10</sup>
- Provides replacement 18 GHz spectrum to accommodate potentially displaced 340 MHz split channels.<sup>11</sup>
- Requires a new narrowband channel plan in the 1560 MHz split, but does not introduce interference problems associated with a significant shift in transmit/receive spacing.
- Promotes sharing between non-ubiquitous FSS, CARS, and FS systems on a co-primary basis

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<sup>9</sup> See NPRM para 32. In the 18.6-18.8 GHz band the PFD limit is  $-104 \text{ dBm/m}^2/200\text{MHz}$  compared with the proposed PFD limits of  $-120 \text{ dBW/m}^2/40\text{MHz}$  and  $-118 \text{ dBW/m}^2/1\text{MHz}$  for GSO/FSS systems (see NPRM para 59).

<sup>10</sup> One of the unresolved issues includes the 30 MHz between 18.55 and 18.58 GHz currently used by CARS systems that will be allocated to GSO/FSS. One possibility to resolve the issue would be to shift the entire CARS band segment 18.14 – 18.58 MHz down 30 MHz. This would result in the sharing of spectrum in the band segment 18.11 – 18.55 with fixed point-to-point systems. In addition, we propose that the frequency segment 17.7 – 17.74 currently paired with the 40 MHz segment 19.26 – 19.3 MHz being allocated to ngso/fss be allocated as one-way fixed point-to-point.

<sup>11</sup> A search of the Comsearch database revealed approximately 1506 paths in the 1560 split. Based upon some sample studies conducted and our experience coordinating channels in the band, we feel that most of the 340 split channels can be successfully relocated to the 1560 MHz split.

in the band segments 17.7 - 18.55 GHz.<sup>12</sup>

- Results in both the GSO and NGSO spectrum being “equally” affected by incumbent duplex microwave links in the 340 MHz split by assigning 18.55-18.8 GHz to GSO/FSS and 18.8-19.3 GHz to NGSO/FSS.

In addition to adding narrowband channel plans in the 1560 MHz T/R split, the Commission should also consider rechannelizing the 23 GHz band for narrowband usage. The 23 GHz band will be useful for relocating displaced 18 GHz paths.

In exchange for giving up the right to license new co-primary facilities in 18.58-19.16 GHz, FS licensees must be assured that the 17.7-18.55 and 19.3-19.7 GHz bands will continue to be available to them. As discussed below, service rules should be implemented to minimize the effect of earth stations on these bands.

### **Spectrum Sharing**

We agree with the Commission’s tentative conclusion that sharing between ubiquitously deployed earth stations and terrestrial fixed microwave is impractical. While it would be possible, given sufficient data, to successfully engineer both systems to coexist, this sharing environment would rapidly erode in direct relation to the number of deployments and eventually lead to frequency gridlock. Based upon estimates of hundreds of thousands of earth station

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<sup>12</sup> There exists a significant amount of fallow 18 GHz spectrum in non-urban areas throughout the U.S. that ES providers could utilize without significant impact on FS operations. See attachment A.

receive sites, interference concerns would eventually negate future deployment of either system. Earth stations that are designed for the consumer market would be unable to effectively market and deploy due to changing exclusion zones created by terrestrial systems and as the earth stations proliferated, subsequent terrestrial systems would be unable to find clear spectrum.

We also agree with the Commission's assessment that sharing between the terrestrial fixed service and non-ubiquitous satellite operations is feasible and can be effectively implemented using the existing prior coordination procedures outlined in Rule Parts 25.130 and 101.103.<sup>13</sup> This process has proven to be an efficient and effective means at dealing with shared band facilities as indicated by the tens of thousands of systems successfully engineered during the past 20 years.

To facilitate sharing of the spectrum, the interference potential between user systems must be equitable to the extent possible. Significant operational differences exist between ES and FS systems that exacerbate the interference potential. Terrestrial microwave systems at 18 GHz are highly directional and typically utilize a single frequency (5 - 40 MHz bandwidth) at each end of a link. GSO earth stations, on the other hand, are typically coordinated to allow for operation throughout the entire satellite arc and to use the entire frequency band. These differences allow earth stations to affect more spectrum and more area than are necessary for their operations at a given time and place. This "interference imbalance" is further enhanced by the fact that earth

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<sup>13</sup> See NPRM para. 22 and 32.



stations operating in the 18 GHz band are recipients of potential interference. Whereas the terrestrial licensee is required to clear all potential conflicts into the ES location, the ES operator can locate his site anywhere and simply choose to accept the potential interference. Problems subsequently arise when microwave paths are proposed that impact the same earth station and the conflicts are not accepted by the ES operator despite being less severe.

This “interference imbalance” can be improved with the introduction of specific service rules. Earth station licensees sharing with 18GHz terrestrial systems should be encouraged to site their facilities away from urban areas, locate them as close to ground level as practical, and take advantage of local shielding. Since FS usage is concentrated in urban areas (as shown on attachment A), the Commission should consider developing distance criteria from urban areas where ES siting is restricted. To the extent possible, the specific frequencies and satellite arc should be identified. Documentation should be required with the coordination notice including a 360 degree detailed description of the local blockage. With this information as part of the coordination record, subsequent microwave systems would be able to coordinate around the earth station without the burden and expense of conducting path blockage surveys. The development of service rules in shared bands will facilitate system deployment and promote spectrum efficiency.

### **Impact of BSS at 17.7-17.8 GHz**

The use of the 17.7-17.8 GHz band for ubiquitous BSS receivers will be problematic because interference from existing terrestrial services will limit earth station deployment. This will be especially true in urban areas where terrestrial services are more prevalent. The use of this portion of the band will be severely restricted and impact the long-term viability of the band.

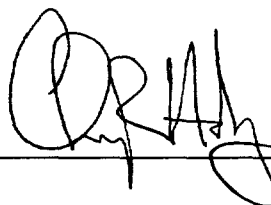
### **Conclusion**

Comsearch commends the Commission's desire to equitably allocate spectrum to existing and emerging communication technologies in the 18 GHz band. We feel, however, that the band plan proposed in the NPRM unnecessarily disrupts the existing frequency plan and introduces long term sharing problems. For these reasons and others stated herein, the Commission should consider the alternative band plan proposed.

Respectfully Submitted,

**COMSEARCH**

Prepared by: \_\_\_\_\_

A handwritten signature in black ink, appearing to read 'CR Hardy', written over a horizontal line.

Christopher R. Hardy

2002 Edmund Halley Drive

Reston, Virginia 20191

## **Attachment A**

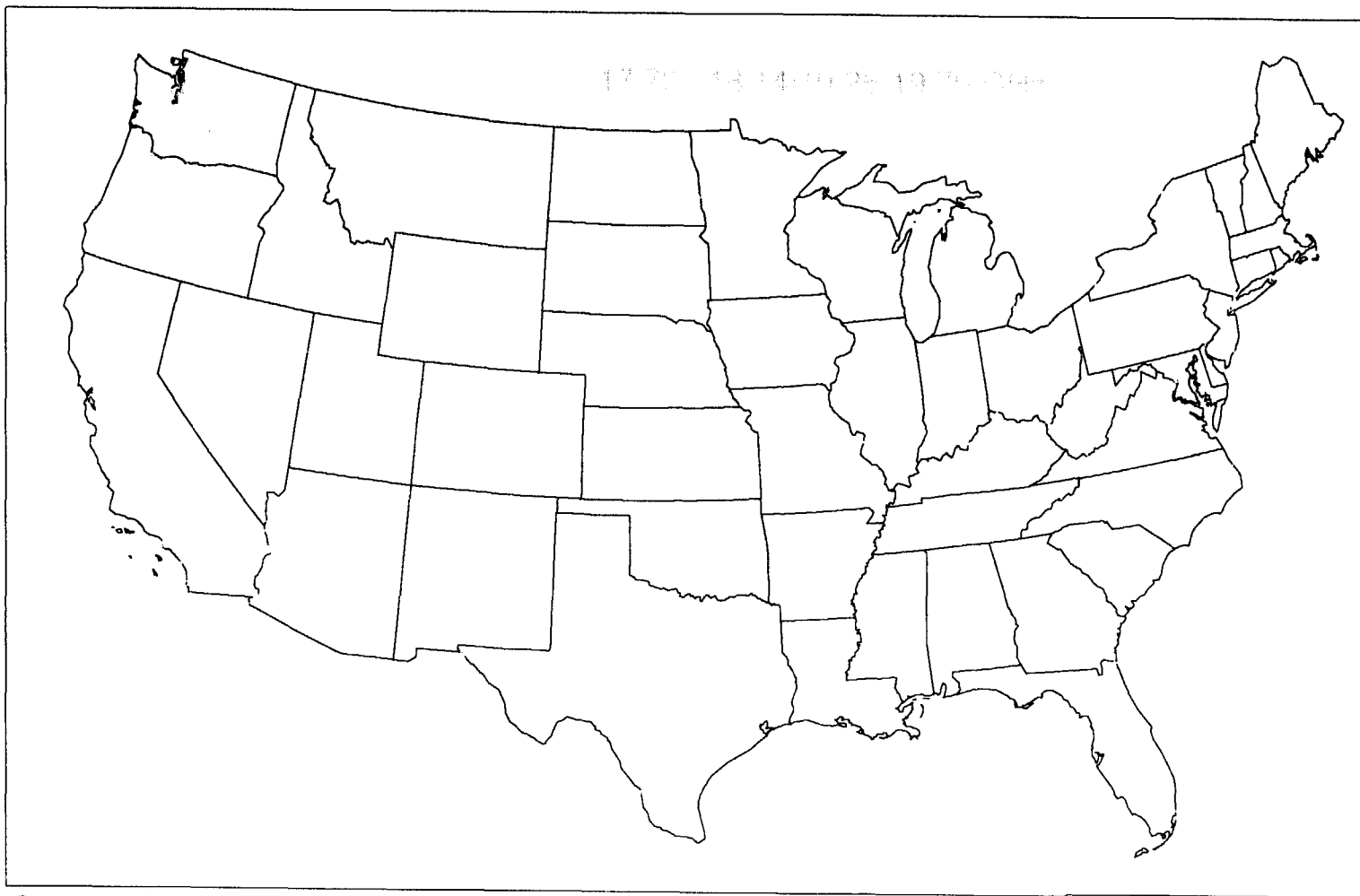
### **18 GHz Microwave Plots**

Plot 1 – 17.7-18.14 GHz, 19.26-19.7 GHz, Wideband Point-to-Point

Plot 2 – 17.58-17.82 GHz, 17.92-18.16 GHz, Narrowband Point-to-Point

Plot 3 – 18.14-18.58 GHz, CARS/AML

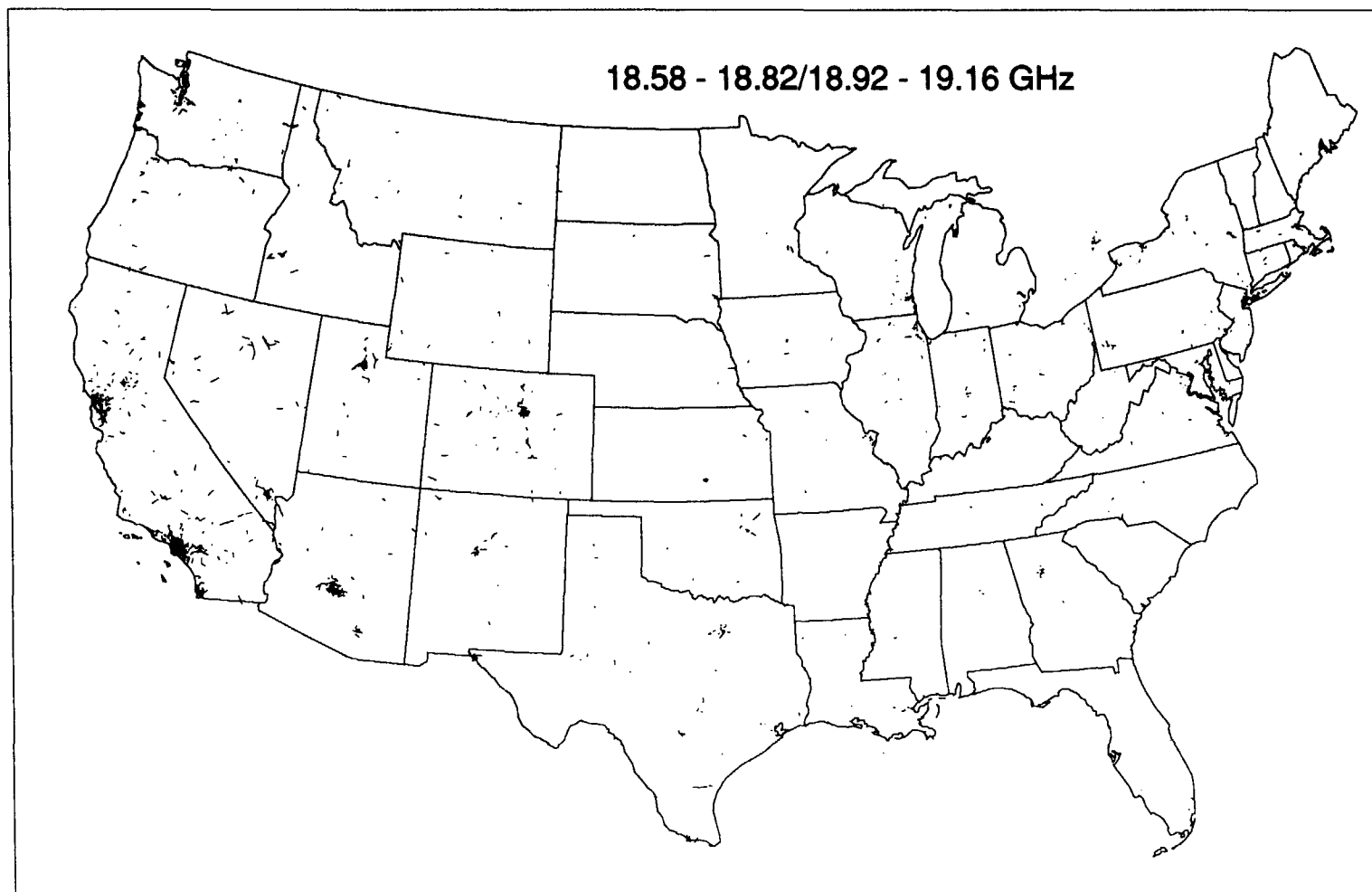
# 18 GHz U.S. Microwave Paths



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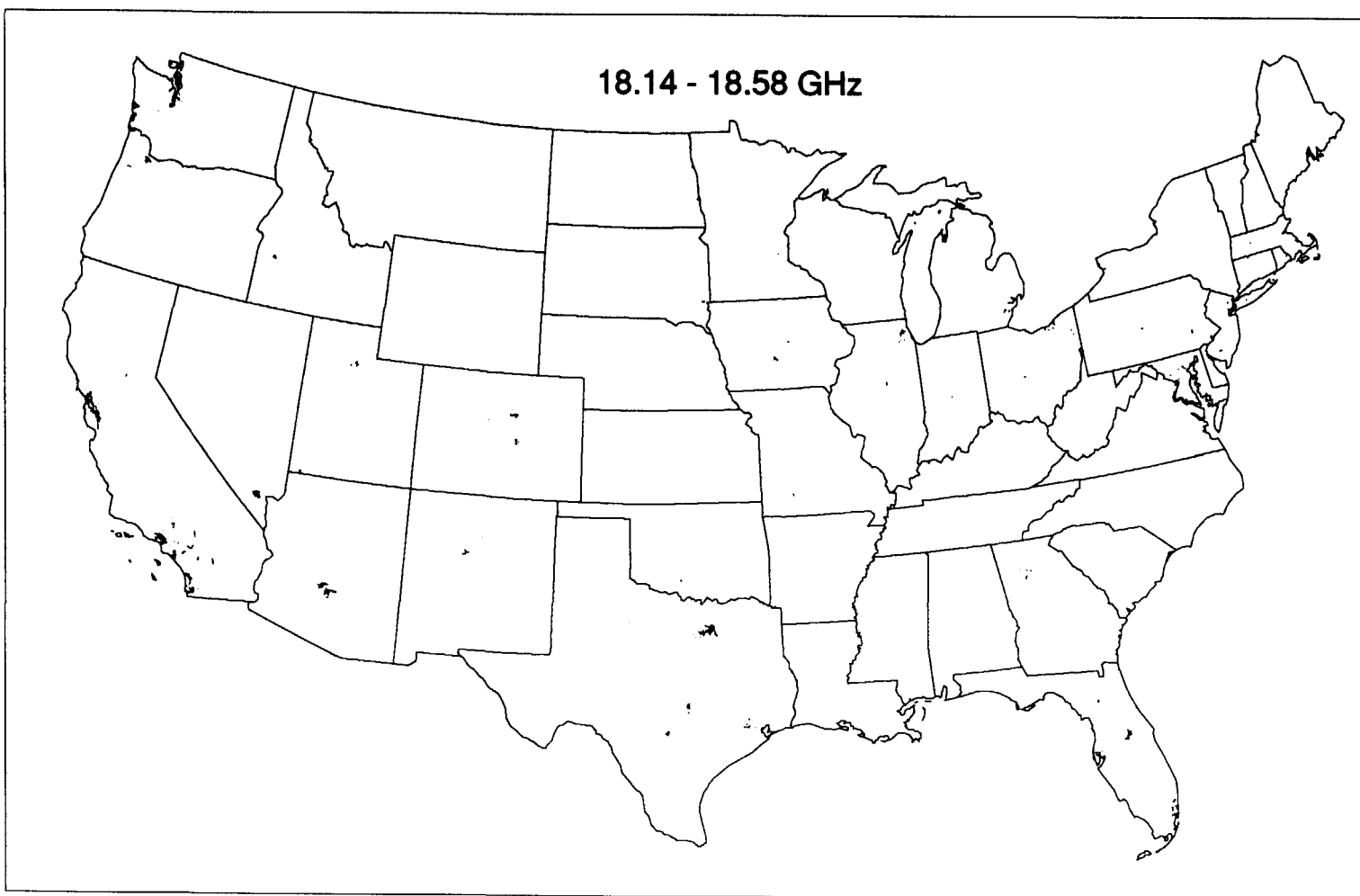
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